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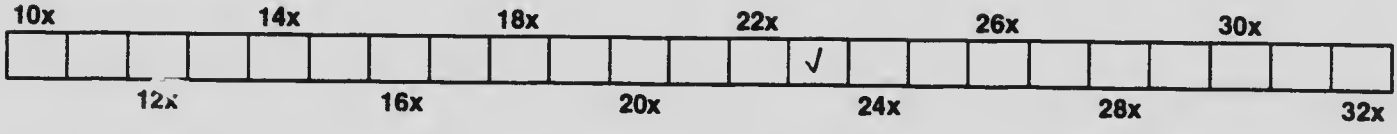

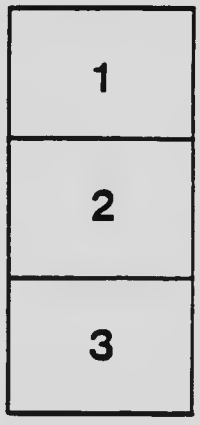

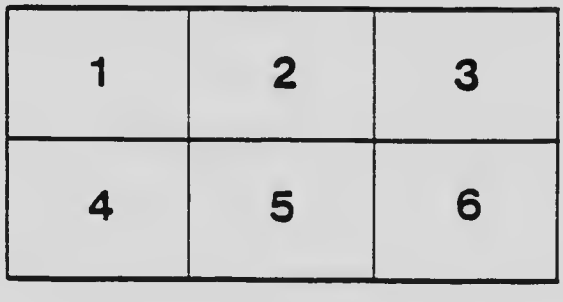

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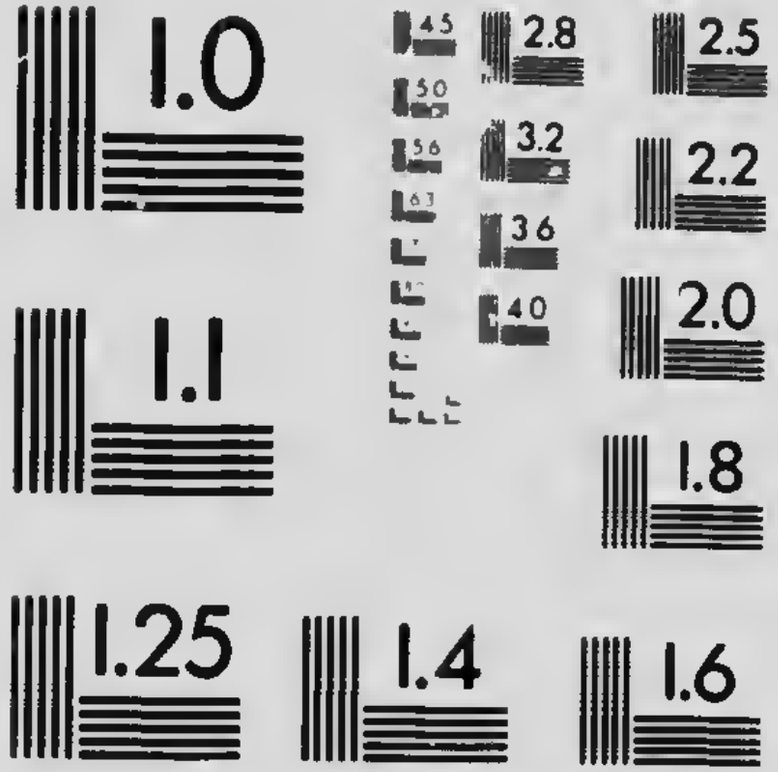

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REPORTS

Mineral
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OFFICIAL REPORTS

OF THE

Mineral Resources of Lake St. John District

REPORT TO PROVINCIAL GOVERNMENT OF QUEBEC

BY

J. OBALSKI,
MINING ENGINEER AND INSPECTOR OF MINES.

AND

REPORT TO THE CHIBUGAMOO MINING CO. LIMITED

BY

JOHN E. HARDMAN, S.B., M.A.E.

1905

Mr. Peter McKenzie, the Discov. -er of Valuable Ores in the Chibugamoo Country.

Report to Provincial Government of Quebec

BY

J. OBALSKI,

Mining Engineer and Inspector of Mines.

HON. S. N. PARENT,

Minister of Lands, Mines & Fisheries,

Quebec.

Sir,

I have the honor to submit my yearly report on the mining operations in the Province.

This industry is constantly progressing, while every year brings new developments and fresh discoveries. A fact worthy of note is the introduction of electric power in the asbestos and chrome mines of the Coleraine region and in the Eustis copper mines.

As an appendix to this, you will find a report on the exploration made by me at Lake Chibogomo. I cannot too earnestly call your attention to this new district and to the important discoveries made there, for I consider it as destined to play a great rôle in the industrial development of our Province.

I have the honor to be,

Sir,

Your obedient servant,

J. OBALSKI, M.E.,

Inspector of Mines.

Quebec, February, 1905.

EXPLORATIONS

IN THE

LAKE CHIBOGOMO REGION

Lake Chibogomo is on the water-shed of Hudson's Bay and, at its north-eastern extremity, is two days' journey or about 35 miles from Lake Mistassini.

This region, which we shall in future call the *Chibogomo Mining District,* was traversed in 1674 by the Jesuit Father Albanel, then explored in 1870 by Mr. James Richardson, of the Geological Survey, and in 1885 by Mr. A. P. Low of the same survey. In 1897 Mr. Henry O'Sullivan made an exploration, and surveys were also made in 1899 by Mr. C. E. LeMoine. In 1903, Mr. Peter McKenzie made two trips there: one in the spring and the other in the summer, and, in the autumn of 1904, I made in company with him an exploration which forms the subject matter of this report.

From a geological and mining standpoint, the report of Mr. James Richardson (G. S. 1870, page 292) is the first and the most important. It mentions the existence in that region of a zone of chloritic schists, diorite, serpentine, conglomerates and granite which he did not identify, but in which he points out the existence of iron and copper pyrites, of magnetic iron and ochre. At the northwestern end of the lake, he found a development of serpentine leading from the portage as far, he thinks, as the Juggler's Mountain to the west. He

found on a hill of serpentine, which we have since called the *Magnetic Cone*, a mass of blackish limestone, and he observed in its vicinity a local magnetic deviation of 146 degrees. I have since ascertained that this limestone is magnesite, containing, like the surrounding serpentine, grains of magnetite and possessing magnetic properties to such an extent that there is an absolutely neutral zone where the variation is really 180 degrees. We shall return to this question later.

In 1885 (G. S. 1892 to 1895, Vol. VIII, p. 259 L.) Mr. A. P. Low explored that region and verified the facts pointed out by Mr. J. Richardson. He calls attention to the similarity of the rocks examined to those of Sudbury, and shows that the granites found there are not Laurentian, but are long subsequent to the Huronian formation, and that gold might exist there. He says that the district presents important indications of industrial minerals and would be worth the trouble of prospecting.

In 1897 M. H. O'Sullivan (1st and 2nd reports on the country between Lake St. John and James Bay) mentions the observations made by previous explorers and, on the portage between lakes Chibogomo and Wacounepi he found near the magnetic cone a variation of 166 degrees caused, he thinks, by some deposit of magnetic iron in the neighborhood. He also speaks of a spring of water of considerable volume at that place.

Relying on these data, Mr. Peter McKenzie undertook an exploration in the spring of 1903 from which he brought back good specimens of asbestos, iron pyrites and rocks showing the nature of the formation. He returned there during the summer and found chalcopyrite and bornite. These specimens and the accompanying information having been submitted to me, I recommended the Government to have these discoveries

corroborated and I started on that exploration in the middle of August, 1904, with Mr. Peter McKenzie.

We proceeded from Quebec to Roberval on the 12th August by the Quebec & Lake St. John Railway and, after procuring Montagnais guides at Pointe Bleue, we had our provisions and canoes conveyed by vehicle to the *Portage a l'Ours*, 25 miles from Roberval on the Chamouchouan River, as there is a good road leading thither.

On the 19th of August we took to our canoes, followed the Chamouchouan River for 33 miles and the Chigoubiche River for 22, reaching the lake of the same name on the 27th. From that point we crossed Lake Chigoubiche (14 miles) situated 6 miles from Lake Chamouchouan (8 miles) whence the River Nikaubau (20 miles) leads to the lake of that name (6 miles), then crosses a series of lakes of minor importance leading to the height of land (14 miles); from there we crossed several small lakes (5 miles) finally reaching great Lake Obatogoman (15 miles) full of islands; then, after 10 miles of river and portage, we came on the 9th September in the evening to the head of Lake Chibogomo (20 miles). This we crossed only on the 11th September, proceeding then to Paint Mountain, at its other end, where our work of investigation was really to begin. The country traversed during the journey, as far as Lake Obatogoman, is analogous to that found north of the St. Lawrence, and, for a complete description, I refer to the reports above cited, and specially to that of Mr. H. O'Sullivan.

The land is generally undulating, fairly well timbered; the soil is clayey as far as the foot of the Pemonka rapids (35 miles from Lake St. John); from there to the Chaudière Falls, the banks of the Chamouchouan River consist of steep Laurentian granitic hills, as much as 700 or 800 feet high, and on which

there is but little good timber. The river itself to that point, a length of 20 miles, is but a series of heavy rapids, very difficult even for poling. The great Chaudière Falls, at least 100 feet high, constitute a splendid water-power, which I calculated could furnish 100,000 horse-power at low water. These falls are followed by a series of other falls and rapids, which are likewise fairly considerable for a distance of 3 miles to the forks. At this point the river turns to the north and is the way to Lake Mistassini *via* the Chief's River. It may also be followed to rejoin Lake Chamouchouan, but the Indians find this way much more difficult going up, although there are fewer portages; it is, however, easier to descend that way with larger canoes than by the Chigoubiche.

We then took the River Chigoubiche which runs northwestwardly. This river is rather shallow and rocky, and there are 15 portages on the 22 miles of the way up to reach Lake Chigoubiche. On this river are several falls and rapids that might be used as water-powers, amongst others the Vermilion Falls, 50 feet high, capable of furnishing 9,000 horse-power, and the Gras Falls, 40 feet high, 4,000 horse-power.

The valley of this river and lake present a series of hills of slight elevation near the rapids, and low and, at times, ground near the still water. The soil consists of sandy loam, and there is a great variety of trees of good dimensions in some valleys.

The ascent of the Chigoubiche River can be effected only with small canoes from 15 to 18 feet long, and, as it is impossible to cross the lakes with these in heavy winds, delays of several days are sometimes necessary, as we found. From Lake Chigoubiche to Lake Chamouchouan (a distance of 6 miles) the country is fairly level, and there is only one portage between the waters of the rivers Chigoubiche and Chamou-

chouan. Then, after following a very winding river, through swamps and small lakes whence one sees well-wooded hills, Lake Chamouchouan is reached.

The Hudson's Bay Company had a small post at the head of the lake. It was abandoned two or three years ago, but the *McKenzie Trading Company* had built close by a small log camp in which it keeps a depot of goods and provisions. From this lake we proceed by the River Nikaubau to Lake Nikaubau. The country is level, consisting of sandy loam, with a fair abundance of small timber, Banksian pine and black spruce predominating. Having stopped near this lake we explored on the southwest side the Foam Falls and Askatiche River, whose valleys are also level, with the same sandy loam and small timber, a portion of which has recently been burned.

The River Askatiche, which is of rather considerable size, is the discharge of a very large lake whereof we saw the bays only.

According to the guides, it is much larger than as shown on the maps, and it seems to be the way leading to the waters of the St. Maurice. This lake forms a large sheet of water parallel to Lake Nikaubau (?)

From Lake Nikaubau one follows for 14 miles a series of lakes of medium size to the height of land or water-shed represented by a chain of wooded hills some fifty feet high, whose altitude is 1,275 feet above sea level. From that point one descends through undulating land, covered with small timber, by a narrow river with three or four portages to great Lake Obatogoman, which discharges by the river of the same name into the Nottaway River. This lake, which has been only incompletely surveyed, contains several hundreds of small islands of various dimensions, those I visited consisting of granite.

Towards the end of the lake one comes in contact with the *Huronian* formation, which is thence followed constantly, and prospecting for the minerals of that formation can then be begun. The road then continues with four portages by a narrow river flowing through undulating land covered with small timber, with some widenings forming ponds, to Lake Chibogomo.

As far as the end of Lake Obatogoman, the rock consists exclusively of Laurentian gneiss, in which are numerous veins of pegmatite containing a little white mica, but not of workable dimensions.

There may, however, be some of larger dimensions in the interior. Scattered through the gneiss, magnetic iron also is found at various points, but in too small quantities. Above the Chaudière Falls a little pink calcite is also to be seen. On the other side of the height of land I met with a little gray gravel in which, by panning, I found a couple of very minute colors of gold, but I attach little importance to this indication.

To sum up, as far as the end of this Laurentian formation I noticed no mineral having any industrial value, and it is really only from the northeastern extremity of Lake Obatogoman that one finds a variety of rocks worthy of interest, and I consider that an examination and prospect should be begun from the first portage towards Lake Chibogomo, as the rocks there are well exposed.

CHIBOGOMO DISTRICT.

Lake Chibogomo is a large sheet of water of a variable length of about 20 miles and an average width of about 10 miles, with several deep bays. It has many islands, some being of granite and others of schists and diorites. The

beaches consist of boulders, generally dioritic; the land is undulating and covered with timber, among which are large trees of canoe-birch. At the northeastern extremity are the Paint or Vermilion Mountain, the Juggler's Mountain, the Sorcerer's Mountain, and others not exceeding 500 feet in height. This lake has two outlets into Lake Doré, the head of the River Chibogomo.

I specially prospected this district from the first discharge of the lake to the head of McKenzie Bay, and on both of its shores.

GOLD.

About a mile before reaching Copper Point, on the shore, among the dioritic boulders, are some pieces of yellowish quartz in which I found gold for the first time. The shore rises in a slope which, further on, becomes Paint Mountain. A few hundred feet from the beach are numerous blocks of quartz, and one comes upon an out-cropping which I followed for a length of 2,000 feet in an easterly and westerly direction. At the highest point on the east, about 80 feet above the lake, the vein is fully indicated by a mass of quartz, which seems to dip vertically; the southeast wall is very clear, and in the transversal direction I measured 30 feet of quartz which is afterwards covered with earth and trees. I was thus unable to get to the other wall, and there must consequently be a considerable mass at that spot.

This quartz is the same as that found on the shore of the lake, and gold can be seen at several places in small grains in the quartz. Pyrite is also seen there in pockets which sometimes contains copper. In some parts of the vein the quartz is cavernous, probably owing to the decomposition of the pyrite. This pyrite itself contains gold. I crushed roughly with a hammer some quartz which showed no gold, and in

nearly all the specimens of a few pounds only, thus treated and afterwards panned, I found colors which were generally light. I then had various pieces of quartz broken up and obtained lumps showing gold. I also washed in a pan the debris representing about a hundred pounds. The concentrate, weighing about 8 ounces, showed numerous colors, and the assay showed 9.4 ounces of gold and 3.6 ounces of silver to the ton. Taking the value of gold at $20.00 to the ounce, and that of silver at $0.58, this would give $190.00 per ton of concentrate.

A specimen of quartz, showing neither gold nor pyrite, yielded as follows:

Gold	0.45 oz. per ton,	$9.00
Silver	0.10 oz. per ton,	0.06
		$9.06

Iron pyrite mixed with rock yielded:

Gold	0.04 oz. per ton,	$8.00
Silver	1.10 oz. per ton,	0.64
		$8.64

A specimen of copper pyrite from this vein, taken by Mr. P. McKenzie and assayed by Mr. T. J. Donald, yielded 3,21 oz. of gold, say a value of $64.00.

The other specimens were taken by me and assayed by Mr. M. L. Hersey.

Other specimens of quartz yielded no gold or only traces: the highest giving 0.04 oz., say 80 cents per ton.

By panning the earth in the vicinity of the vein, I found in each pan very light colors, amounting to 30 colors in one case. I also washed some earth from between the vein and the lake which gave me colors. I likewise found some at the

Gras Chute, Chigobiche River.

Chigobiche River—A Chance Meeting with Indian Family.

outcropping of the copper vein, in the direction of the quartz vein in rusty rock on the top of Paint Mountain, on the other side of that mountain on Portage Bay, and in the crevices of the rock at the entrance of that bay.

From all these facts I conclude that the quartz vein in question is truly gold-bearing quartz wherein gold exists in a finely divided state, and that the pyrite contains a notable proportion of gold. The colors of gold found in the earth come from the disintegration of the rock and the decomposition of the pyrites. Without seeking to judge beforehand of the importance of this vein, which can be established only by other works, I consider that all the region of Paint Mountain should be carefully prospected, as colors have been found a couple of miles northeast of these outcroppings.

COPPER.

Mr. Richardson (G. S. 1870-71, page 304) speaks of copper pyrite on the shore of Lake Chibogomo near Paint Mountain, and Mr. McKenzie ascertained the existence of chalcopyrite and bornite in that region on a point which he called *Copper Point*. A few blasts at that place showed the beginning of a vein a couple of feet thick in which these two varieties of ore are found mixed with quartz. The vein seems to run in a northerly direction, the encasing rock being a variety of schistous diorite called by Richardson chlorite schist, in which are also pieces of chalcopyrite. Not enough work has been done so far to characterize this prospect, but it is interesting and is worth the trouble of developing. A specimen of massive chalcopyrite was assayed with the following result:—

Copper	23 8 p.c.	=	worth $59 50
Gold	0 04 oz.	per ton,	worth 0 80
Silver	2 36 "	" " "	1 37

A specimen taken by Mr. P. McKenzie and analyzed by Dr. T. J. Donald gave:—

Copper	23 37 p.c. equal to	$55 90
Gold	traces.	
Silver	1 46 oz. worth	0 74

Another specimen assayed for gold only gave.

Gold	0 13 oz. worth	$ 2 62

By panning the earthy debris in the crevices of the vein, I found colors of gold.

The gold-bearing quartz vein above mentioned contains small pockets of copper pyrites and, while prospecting on the top of Paint Mountain, I found small veins of quartz with a little chalcopyrite.

In his report for 1892 to 1895, page 257, Mr. Low observes that the deposits of iron and copper pyrites are, from a geological standpoint, in the same conditions as the nickel deposits of Sudbury and that it is not impossible that the latter mineral may be found in this region, although the assays so far made do not show any.

IRON PYRITE.

Mr. Richardson mentions this product as having been found in the vicinity of Paint Mountain, and he says that in some places the proportion in the rock may amount to 15 or 20 per cent. I verified this statement and found, especially on the south shore of Portage Bay, a dioritic rock and chlorite schist containing a great abundance of grains of pyrite. Work was done at that point in the hope that this pyrite might contain other minerals, but a specimen that was assayed showed that the iron pyrite contained neither gold nor traces of nickel or copper.

On the other side of Paint Mountain, towards the lake, are rather important outcroppings of rusty rocks and, after digging at that spot, very light porous quartz was discovered on the surface which, at a depth of a few feet, becomes impregnated with iron pyrite. This mass seems rather important and a large deposit may be looked for there. The assay of a specimen gave:

Proportion of pyrite in the rock.....	50.83 p.c.
Sulphur in concentrate.....	44.94 p.c.

It contains neither gold nor copper.

A short distance below, towards the lake, is a deposit of *red ochre* which has given the locality the name of Paint or Vermilion Mountain. The first explorers merely mentioned this deposit of ochre; but it differs greatly from the deposits of ochre we know of in other regions and which are found in swamps, being due to the precipitation of oxyde of iron coming from ferruginous water, while here the oxyde of iron is due to the decomposition of the pyrites in the vicinity mentioned above. From this standpoint this ochre is remarkable as being an indication of deposits of pyrite, but it is of little value as ochre. Moreover, at other points on the mountain, other small deposits of earthy oxyde of iron are found which are generally red, and there are many outcroppings of rusty rocks.

ASBESTOS.

Serpentine was mentioned by Richardson as existing on the magnetic cone, but he does not speak of asbestos. Mr. P. McKenzie, in a first exploration, found that a large island at the head of McKenzie Bay consisted of serpentine and he discovered there some veins of fine asbestos. Some blasts were afterwards fired at points where asbestos showed and I ascer

tained by five or six different prospects, that on the west part of the island called *Asbestos Island*, over a distance of from 600 to 700 feet, commercial asbestos was to be found.

The serpentine is analogous to that of the Eastern Townships, but a little darker in color; in some places it is compact, and somewhat hard and, in others, schistous and broken. Asbestos is not found here exactly as it is at Thetford and Black Lake, but it is certainly abundant enough to justify mining operations on the island. Its length varies, but sometimes attains 2½ inches in a single thread. At one point I saw blocks of fibre as much as 6 inches long but divided into several smaller veins. The island consists of a hill 150 feet high, but in the centre and on the eastern side, I found only a black serpentine with a black and semi-metallic streak. Mr. Hersey considers that this color is due to earthy oxyde of iron. There is a strong magnetic attraction all over the island, and the rock itself is slightly magnetic. The section known to contain asbestos is about 600 or 700 feet with a height of from 60 to 80 feet above the lake. At several points where the serpentine is schistous, large blocks of hornblende are found, sometimes presenting a fibrous aspect sufficiently pronounced to allow of its being used as asbestos, being similar to the specimens from Italy that I have seen.

On the north shore of McKenzie Bay, from the magnetic cone to the entrance of the Rapids River, there is a continuous development of fine greenish serpentine, very compact. I penetrated but a slight distance inland and I saw only very small fibrous veins near the lake, but I am inclined to think that regular prospecting would lead to the discovery of commercial asbestos. This belt of serpentine also runs for several miles, especially on the left bank of the Rapids River and I can thus say that I found it over an approximate distance of

Chaudiere Falls in Ashuapmouchouan River. Middle Fall.

The Upper Rapid, Chaudiere Falls, Ashuapmouchouan River.

seven or eight miles from the magnetic cone. It is also quite probable that it continues further. Mr. Richardson thinks it goes about a couple of miles in the direction of the Juggler's Mountain, but my inspection of that mountain revealed nothing but diorite.

In the report of the Geological Survey for 1870, we find that the assay of that serpentine by Dr. Sterry Hunt, showed numerous grains of chromic iron and the presence of nickel.

I may mention that Mr. Wm. McOuatt in his report on an exploration of the Lake Abbittibi region (G. S. 1872-73, page 155), states th. he found on an island in that lake a strongly magnetic serpentine which, according to the assay, contained (me and nickel. Perhaps, therefore, there may be a serpentine formation at that spot and this should be pointed out to prospectors.

I also found serpentine on the south shore of the narrows leading to McKenzie Bay, but I did not observe any fibrous portions.

MAGNETIC IRON.

Magnetic iron has been found in other parts of this region.

On the south-east side of Paint Mountain I verified the indications mentioned by Mr. Richardson. After passing Copper Point, in the direction of the mountain, a rock is found of dioritic aspect, containing a great many grains of magnetic iron. It is possible that larger masses may be discovered by working. In any case, this deposit may, for the future, constitute a reserve of ore of low grade owing to its mixture with the rock, but which can easily be concentrated. Mr. Richardson says that he found it over a width of 50 feet, which he followed for 200 paces, and he estimates that this mass may

contain from 15 to 20 per cent. of iron. This is possible, but it should be confirmed by working and by assays.

A kind of black serpentine with a semi-metallic streak exists in great abundance on Asbestos Island. This serpentine is also magnetic and contains a certain proportion of magnetic iron in the pulverulent state from which it derives its color. It is possible that in this region the magnetic iron is not always scattered and that searches will result in the finding of larger masses.

In addition to the above various indications, Mr. McKenzie found on the south-east side of the Sorcerer's Mountain small veins of a compact ore very strongly magnetic and which showed when assayed:—

Iron	65.43
Sulphur	0.17
Phosphorus	0.04
Titanium	Traces.

This ore is found in the rock in numerous small veins of from one half an inch to an inch and some parts possess the properties of loadstone.

MAGNETIC CONE.

Mr. Richardson says that at this point he found what he calls a vein of carbonate of lime. I carefully examined the place and found that in its vicinity the magnetic needle was so affected that it turned completely around from north to south, presenting an entirely neutral zone; this I, moreover, found to be the case over a distance of nearly a mile in an approximately easterly direction. I did not carry my investigation beyond that distance. Having caused an excavation to be made at this neutral point on the top of the hill 125 feet high which I call-

Party Descending White Spruce Rapids, Ashuapmouchouan River.

The Lower Rapid, Chaudiere Falls, Ashuapmouchouan River.

ed the *Magnetic Cone*, I found a ferruginous rock decomposed on the surface, which becomes solid lower down. This rock is slate-blue in color and the assay showed:—

Protoxyde of iron.....	9.51
Carbonate of lime.....	12.42
Carbonate of magnesia	70.94
Silica (by difference).....	7.31
	100.00

Corresponding to 7.47 per cent. of metallic iron.

It is pretty strongly magnetic and I am inclined to believe that the iron it contains is chiefly in the state of magnetic iron mixed; this can be ascertained by crushing the rock from which numerous magnetic grains may be separated by the magnet.

The portion decomposed on the surface showed:—

Metallic iron	11.87 p.c.
Phosphorus	0.02
Sulphur	0.30

It seems more strongly magnetic than the solid rock.

The serpentine of this magnetic cone, containing 20 per cent. of magnetite, taken in the vicinity of the rock above mentioned has an effect on the compass which may compare with the most magnetic ores I have examined. It is possible also that the magnetic parts may be loadstone. I consider these facts very curious and interesting to study and I am inclined to believe that deeper workings would lead to the discovery of ores with a higher percentage of iron and offering suitable conditions for industrial utilization. In any case, it is worth while to make the trial.

I also went over this section with the dip needle and found the attraction considerable over a pretty large area, the attraction frequently reaching the maximum of 90°. This was pointed out by Mr. Richardson, who observed a variation of 146° at one point, and by Mr. O'Sullivan, who observed 166° at another.

A quarter of a mile east of the cone and near the portage is an abundant spring supplying a great quantity of cold water, which did not seem to me to possess any mineral properties.

LOCAL GEOLOGY OF THE DISTRICT.

Starting from the contact of the Laurentian with the so-called Huronian formation, found to the north-west of Lake Obatogoman, one follows a formation which is generally dioritic and well-marked in the portages, while the beaches consist of large rounded boulders of diorite, and granite with some pieces of hard limestone, probably similar to the limestone of Mistassini. The massive diorite varies in color from dark to light green and sometimes presents a schistous appearance. It is frequently crossed by veins of quartz. These conditions continue as far as Lake Chibogomo. Nevertheless, the islands in the north-east part of that lake consist of coarse-grained granite similar to that of the islands in Lake Obatogoman and differ from the Laurentian granites.

On arriving at the large island of the portage where Paint Mountain lies, more broken country is found and the north-east part presents a more schistous and greenish aspect. Messrs. Richardson and Low called these rocks chlorite schist. The other side of Portage Bay has the same dioritic rocks, but on entering the narrows, granite is seen on the left shore, and conglomerates also granitic, which seem to be a contact rock thus transformed by granitic eruption. On the right shore are

The Ashuapmouchouan River, below Pemonka Rapids.

Vermilion Falls, Chigobiche River.

diorite and serpentine. On reaching McKenzie Bay all the rocks on the north-west as far as the Juggler's Mountain are compact diorite. But on the south-east shore, between two deep bays, granite is likewise found alternating with diorite, while conglomerates are seen on the islands. All the north-east part consists of a belt of serpentine, which includes the magnetic cone, and which is also strongly magnetic at several points. Behind this, diorite is again found.

I ascended the Rapids River, which is navigable for canoes, and flows in a generally south-easterly direction; within a distance of 15 miles, there are 25 rapids and small falls and the river ends in a chain of small lakes. On both banks is a succession of diorite, granite and serpentine with banks of gravel and sand at some points On the left bank, about the 4th rapid, I observed a development of talcous schist with compact talc in some places. About the 11th rapid there is a large mass of rusty schistous rocks, partially decomposed. About the 15th rapid, on the left bank, the serpentine is well developed and presents a schistous appearance with hard fibres.

At the last lake, which I reached, but which is not yet the head of the river, the formation is granitic. I carefully examined the rocks along this river and washed the sand and rusty gravel I came upon, but I found no gold or any indications of other minerals. Nevertheless, these rusty rocks deserve further prospecting.

The serpentine seen at the start on the left bank and which crosses the river about the 15th rapid, belongs to the belt running from the magnetic cone, and, therefore, covers a considerable area, which I mentioned as being 7 or 8 miles, but which extends much further. I tried to scale this river but the magnetic attraction was too strong to allow of my obtaining

any good results with the needle. On both sides of the river the rocks are covered with moss and there is but little timber widely scattered, consisting chiefly of Banksian pine, which makes it very easy for travelling.

TIMBER AND SOIL.

Along the road fol' wed after leaving Lake St. John and after passing the Chaudière Falls, there is an abundance of timber generally of small dimensions but very suitable for the manufacture of pulp. It consists chiefly of small white birch and poplar in the old burnt districts, balsam fir, black spruce, Banksian pine, large white birch and a little grey spruce.

The black spruce is generally very tall and of good size, a diameter of 10 to 12 inches being frequently found with a height of 60 to 70 feet. In the neighborhood of Lake Chibogomo are large birch trees from which the Indians get bark for their canoes. On the southern slope of the height of land there are some valleys with good sized grey spruce. Judging by the fallen trees, there must have been a great deal of red spruce here formerly, but it has all been destroyed by the saw-fly. A few young trees endeavoring to shoot up are seen here and there.

Where the land is low the soil consists of sandy loam, which could certainly be cultivated, and there are large areas of such land along the road we followed, but less in the region north of Chibogomo, where the ground is more broken.

The climate of that region is similar to the average climate of the counties north of the St. Lawrence. We had some very warm days in the months of August and September. It is true that we had cold weather with snow at the beginning of October, but, on our return, we learned that the same weather

had been experienced between Quebec and Lake St. John and our Indian guides told us the snow does not remain on the ground until after the beginning of November. The altitude of Lake Chibogomo is only 1,150 feet above sea level and the so-called mountains in the neighborhood do not rise more than 500 or 600 feet above it.

FISH AND GAME.

Ouananiche is found in the Chamouchouan River, but it does not ascend higher than the Chaudière Falls. There is not much fishing above this in the rivers, but in the lakes are doré and pike, one variety of which in Great Lake Chibogomo seems to be the maskinongé. We caught some weighing twenty pounds, but some have been caught weighing over thirty. There are also the witouche and an excellent variety of white fish, weighing several pounds. The Indians say that sturgeon are caught in Lake Obatogoman, but I saw none.

In Lakes Chigoubiche, Obatogoman and Chibogomo large-sized *touladi* or grey lake trout (fork-tailed) are caught. I saw no brook trout, but on a previous journey Mr. McKenzie caught one weighing four pounds in the Rapids River. In the upper part of this river we saw the bottom covered with fish-spawn, but I could not ascertain to what species they belonged.

There is an abundance of small game throughout the region, the different varieties of partridge and duck, also hares. We saw but little large game, but from the results of the Indians' hunting we learned that there are many caribou, black bears and lynx. There are neither moose, red deer nor wolves. Many Indian families make a livelihood by trapping fur-bearing animals such as beaver, marten and mink.

SUMMARY.

In the small section I explored, covering a radius of 5 or 6 miles, I found the following as regards the part north of Lake Chibogomo:

1. A great development of serpentine over a distance of more than 7 or 8 miles.

2. On Asbestos Island, where this serpentine was prospected, many veins of asbestos similar to that of the Eastern Townships and whose length attains two and one-half inches.

3. Magnetic iron probably in great abundance, seeing the great attraction exercised on the needle in that region.

4. Indications of iron pyrites from the existence of an important deposit may be presumed;

5. Copper ore of good grade in sufficient quantity to justify further search;

6. Gold-bearing quartz indicated by a very considerable outcropping showing gold in the rock and in the surrounding debris;

7. The probability of discovering the industrial minerals which usually accompany such formations.

The formation of this district, called the Huronian formation, is well developed, and, according to a map recently published by Dr. Bell, director af the Geological Survey, this formation covers a considerable area in the western section of that part of the Province where a belt 140 miles wide from north to south is indicated, through which the new transcontinental railway will run.

All the explorers of the Geological Survey who have visited this region agree as to the possibilities it offers from a mining point of view, belonging as it does to the same great forma-

tion containing the important mining districts of Lake Superior, of Northern Ontario and of Temiscamingue.

The land is generally undulating. the highest mountains not exceeding 500 or 600 feet. It is well timbered with pulpwood trees, possesses importan water-powers and contains sufficient arable land to be self-supporting, the climate being favorable thereto.

It is probable that all these advantages will encourage the building of a railway, which need not be more than from 100 to 200 miles long, to connect that district with existing lines.

A company has been organized by Mr. McKenzie under the name of the *Chibogomo Mining Company* for the purpose of developing these discoveries and it is preparing to work this summer.

Report to the Chibugamoo Mining Co. Limited

BY

JOHN E. HA . 'N, S.B., MA.E.

Montreal, July 3rd, 1905.

To the Directors of the Chibugamoo Mining Co., Ltd.,

P. McKenzie, Esq., General Manager,

Montreal, Que.

Gentlemen,—

In accordance with the request made by your manager, in March last, and the letters of March 22nd, and April 11th, between myself and the Secretary-Treasurer of the Chibugamoo Mining Co., Ltd., copies of which are attached, I beg to submit a report of my inspection of your company's property.

ITINERARY.

I left Montreal on the 22nd of May, in company with Mr. W. W. J. Croze, of Duluth, representing the United States Steel Company, and reached your headquarters' camp on Lake Chibugamoo at 1.45 p.m., on Thursday, the 8th of June. The seventeen days between my departure and arrival do not correctly represent the length of time needed for the journey under ordinary midsummer conditions, as they include an unnecessary delay of three days, caused by misrepresentation of conditions or ignorance of facts, displayed by the one or two men in St. Félicien who had previously been to Lake Chibugamoo. Under normal conditions the time should not exceed twelve days for the 192 miles distance between St. Félicien and headquarters' camp on Lake Chibugamoo.

From Roberval, the present terminus of the Quebec & Lake St. John Railway, to St. Félicien, the distance (according to the best maps obtainable) is 13 miles; from St. Félicien to Portage à l'Ours, the distance is about 11 miles, but for the last five or six miles there are no inhabitants nor houses.

My log of the trip shows that Asbestos Island, the most northerly point of my examination, is 181 miles from Portage à l'Ours, or 205 miles from rail communication at Roberval. This fact is significant, and must be kept in mind. The main camp, at the time of my inspection, was located about 6½ miles southwestwardly from Asbestos Island, on what is known as "Portage Island," and on which (at the northeasterly point) is found the "Paint Mountain" of the Indians.

To the Height of Land, a distance of 154 miles from Roberval, the route is along the Ashuapmouchouan River, 34 miles to the mouth of the Chigobiche, up the Chigobiche River, 26 miles, and along Lake Chigobiche for 14 miles to a portage of 1½ miles on the west side. From the western end of this portage, a winding, unnamed river (and small lake) leads, by a traverse of 8 miles, to the southeastern end of Ashuapmouchouan Lake, the length of which, in a northwesterly direction, is 8 miles. From the upper end of this lake, one mile from the post of the McKenzie Trading Co., the Nikaubau River is followed to Lake Nikaubau, a distance of 20 miles, including Little Lake Nikaubau. On Lake Nikaubau the distance traversed was 5 miles to Jordan's River, from which Jourdain's, Obamiscachi, Branch and Long Lakes, with some small streams (amounting in all to a distance of 13 miles) lead directly to the Height of Land, which, where we crossed it, has an elevation of 52 feet above the stream, or 1,277 feet above sea level.

Chibugamoo Lake is only 123 feet below the summit of the Height of Land, but one has to go down hill and then up again to compass this difference. A shallow stream of about 5 miles in length, with several portages, leads to the extreme eastern end of Lake Obatogoman, from which, after a traverse of 15 miles, a series of 4 portages and 4 narrow lakes, which are simply widenings of the two streams traversed, lead to Lake Chibugamoo. The length of the water course between Lakes Obatogoman and Chibugamoo is 12 miles. The distance across the lake, in a straight line from the entrance to the main camp, is 11 miles; the course we took counted 12 miles, and in high winds, when the shore must be skirted, the distance amounts to 15 miles.

Your main camp, therefore, in June, 1905, was situated 197½ miles from Roberval, and the farthest worked point, Asbestos Island, 205 miles from rail transportation.

LOCATION AND AREA.

The position of Asbestos Island, your most northerly possession, is about 49° 57' north latitude, and about 74° 5' west longitude. I am informed that the prospecting licenses held by your company cover an area 4 miles in length by ½ mile in width on the shore north of Asbestos Island, amounting to 2 square miles; an equal area in two licenses covers the southwestern shore of McKenzie Bay; the whole of Portage Island, 7 miles to the southwest, which includes an area of between 3 and 4 square miles; and licenses on the southern shore of Sorcier Mountain, which cover another area of 3 or 4 square miles. Asbestos Island, which contains between 80 and 100 acres, is held under mining license. The eastern one half of Portage Island, and Asbestos Island, are the only portions which seem to me to be worth mining licenses at present.

GEOLOGY.

The geology of the district has only been faintly sketched in the reports which have been issued by the Geological Survey of Canada. In the map of the "Basin of the Nottaway River," accompanying Part K of Vol. XIII of the Geological Survey Reports, (and published in 1903, though compiled in 1896 and prior to that year) the western and northern shores are put down as "Huronian," and described as composed of "Schists, quartzites, arkose, etc.," while a belt to the north, running west from Wakonichi Lake, is described as "Greenstones," i.e., diorites, diabases, etc. While I approach this subject with the respect due the Geological Survey of Canada, I am free to confess that agglomerates, diabases and breccia conglomerates, similar to, if not identical with, the Huronian volcanics of the Ontario shore of Lake Temiscamingue, are plentiful on Portage Island and the adjacent shores. One or two unmistakeable dikes of diorite and gabbro have been found on Paint and Sorcier Mountains by the writer. That eminent member of the Geological Survey of Canada, Mr. A. P. Low, is now engaged in a special study, on the spot, of these rocks, and description can profitably be delayed until receipt of his report.

In many respects the prevalence of magnesia minerals brings to one's mind the rocks of the Eastern Townships, some of which are found duplicated in Chibugamoo district, and the announcement that the asbestos found on Asbestos Island occurs in rocks that may suggest Thetford, will confirm the statement that the *Chibugamoo district is destined to have a large and profitable mineral production.*

I was requested to particularly enquire into the resources of the property in iron, copper, gold and asbestos, and to de-

termine the probability of the existence of profitable auriferous gravels. I will now consider these subjects in their order.

IRON.

As to the existence of *commercial iron ore* on your property, I may say that up to the present time none such has been found. This particular subject was more particularly investigated by Mr. W. W. J. Croze, who accompanied me, and who desired to look into the subject of iron ores on behalf of the United States Steel Corporation. The serpentinous rocks around McKenzie Bay and portions of Sorcier Mountain contain appreciable amounts of iron oxides, some of which are magnetic, and others appear to contain oxide of chromium. The so-called magnetic cone, at the western end of McKenzie Bay, contains such a mass of rock, analysis of whose contents, however, fails to disclose any greater percentage of metallic iron than nine per cent. It is permissible for me, perhaps, to dwell upon the fact that an iron *ore*, at the present day, is a sufficiently large body of iron oxide, containing not less than fifty per cent. of metallic iron, and having its contents of silica, phosphorus, sulphur and titanium within certain very small and narrow percentages. There seem to be on Sorcier Mountain one or two small veinlets, varying from a fraction of an inch to perhaps an inch in width, all pure magnetite ($Fe_3 O_4$), but entirely insufficient in quantity to justify the designation of them as an "ore" of iron. The disturbances which have been noted of the magnetic compass, and the dip needle, are probably due to the occurrence in the country rock of an unusual percentage of oxide of iron, probably in the form of magnetite, but there are absolutely no signs at the present time of any segregation of these particles into a sufficiently large body to win the term of "ore." While it is possible, it may be considered improbable that, bands or belts of iron ore

exist on your property, and it is an absolute truth that, up to the time of my leaving your camp, the 20th day of June, 1905, there had been found no iron ore on your property.

COPPER.

The occurrence at the little cape, or point, called on the map "Copper Point," of particles and small masses of chalcopyrite (with which are associated some secondary minerals, such as bornite and peacock copper), led Mr. Obalski and your managing director to the belief that a vein of copper ore would be found at that point by development. My preliminary inspection of this point on Friday, the 9th day of June, did not lead me to entertain such hopes, and on the 16th of June I put a force of men at work on Copper Point, firing several shots, and found no vein whatever; nor was there any such concentration of the sulphides of copper which occur scattered throughout the country, as to lead me to believe that a lense, pocket or segregation would ultimately be found. The country rock at Copper Point is penetrated by a dike of diorite about sixteen feet in width, having a general northwest and southeast direction, and alongside of this dike, on the northeast side, is a stratum, or member of the country, which through the assistance of Prof. John A. Dresser has been sliced and microscopically examined. It proves to be a metamorphosed, or saussuritized Gabbro, composed of zoisite, chlorite and mica, all secondary minerals derived (in sequence) from plagioclase feldspar, pyroxene and other bi-silicates. It is a rock of coarse texture which has been cooled slowly and under great pressure, and is similar, in fact, identical, with portions of the Serpentine belt of the Eastern Townships. I traced this rock directly across the country to the summit of the peak which lies just east of the top of Paint Mountain, and

throughout its course particles of copper pyrites occur scattered or disseminated throughout the mass of the rock, and without relation to any seam or fissure in the rock itself. On the summit of the mountain the mineral has weathered to such an extent as to have the copper dissolved out, and the iron so oxidised, or rusted, as to stain the entire bare summit of the rock a brownish red color. Samples broken from this summit by your foreman, Mr. Robert E. Cumming, and myself, showed that the rusty stain was only about one-quarter of an inch in thickness, and that below it occurred this gabbro, with the pyrites disseminated just as was observed on the shore at Copper Point. This gabbro, as already stated, is similar to bands which are found scattered throughout the Eastern Townships section, and which (notably in Orford, Ascot, Bolton, etc.) have given rise to veins, carrying considerable amounts of copper, zinc and lead, and which, at different times during the last twenty-five years, have been opened and worked as copper mines. By reason of the similarity of the country, and the prevalence of the copper minerals in this particular member of the measures, I think it is quite possible that further search may reveal the existence of a well defined vein, in which, it is probable, copper minerals will be more or less concentrated, and may afford an ore of copper of commercial value. This statement is merely hypothetical, but is based upon my experience with copper ores in other countries on this continent. The pyrites, when separated and assayed by itself, yields fairly good results in copper, as well as in gold; some samples showing from twenty to twenty-four per cent. of copper, with 80 cents to $2.50 per ton in gold. The fact that your large quartz vein, about to be described, contains a large amount of copper pyrites, which also carries gold, must be borne in mind when considering the possibilities of finding a copper vein.

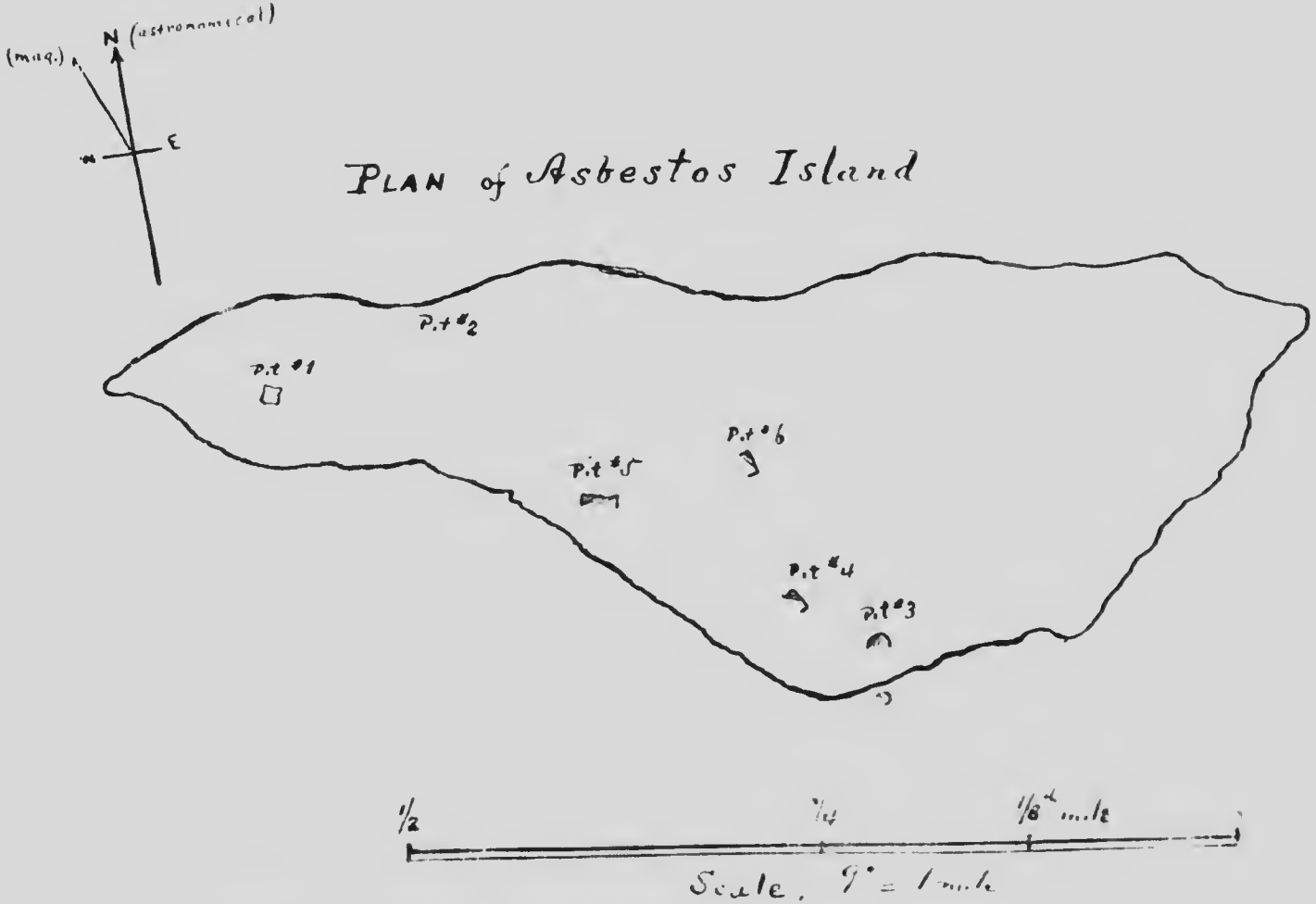
GOLD.

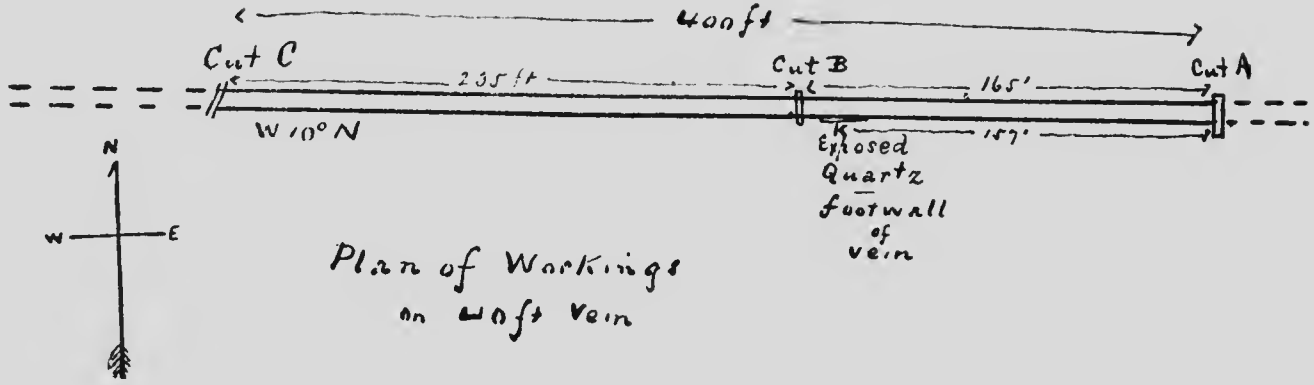
Paint Mountain, on Portage Island, is composed of two peaks, or summits, one lying almost due east of the other. At the base of the southern slope of the eastern peak there has been discovered a deposit of quartz, having many of the characteristics of a vein, and which, by reason of its width, the very long stretch of drift quartz (apparently originating from this vein), and the fact that both the vein and this drift afford free gold in commercial quantities, justified Mr. McKenzie in concluding that the deposit was of undoubted value. On the 20th of February, at Mr. McKenzie's request, I prepared for him some directions, or memoranda, for the preliminary development of the property, in which I asked that before I arrived cross trenches should be dug at right angles to the outcrop of the vein, and made at intervals of 400 to 500 feet, and numbering four or five. I found that, owing to the lateness of the arrival of the miners, (just a week before my own arrival), little or none of this preliminary work had been accomplished, and, therefore, the examination of the gold vein was somewhat delayed; nor was it so complete as it would have been had time permitted the development, or sketch, made in February, to have been carried out. I kept from ten to a dozen men busy on the development of this quartz vein for a matter of nine or ten days, and succeeded in getting a cut completely across the vein from foot to hanging-wall. This was done at a point marked "A" on the accompanying sketch, which point is at, or near, the last exposure of outcrop in an easterly direction. The course of this quartz deposit or vein is West 4° to 10° North, and East 4° to 10° South. The course of the line of boulders is East 10° North.

At a point 165 feet to the westward of cut "A" I started a second cut, denominated by the letter "B," and at a point 400

feet west of cut "A," a third trench or cut, denominated "C," was made. At "A" and "B" the surface was slight nd in some spots the vein was exposed. At cut "C" the surface covering was very heavy, averaging about eight feet in depth, and, as the soil is filled with a multitude of small boulders, many of which required blasting before they could be moved, the progress in this cut was necessarily very slow. A fourth cut, to be denominated "D," was lined out at a point 900 feet west of A and 500 feet west of C, but the depth of surface prevented our doing much in this fourth cut.

In cut A I succeeded in getting what I believed to be the true foot and the true hanging-wall of the massive quartz vein, which, at that point (cut A), is 37 feet in width. Just beyond this measurement there are twenty inches of schist, after which occurs a narrow stringer, four inches in width, of quartz, and then a stratum of diabasic or dioritic rock, which I believe to be the hanging-wall or limit of the quartz. On the foot-wall side, a wall rock schistose in character, is clearly marked and carries its course west 4° north for a considerable distance. A large amount of quartz was quarried from this cut, which was started about five feet in width, and with the intention of making a clean cut with a level bottom right through to the hanging-wall. We found, however, that time would not permit of this, but something like 6 or 70 tons of quartz were quarried out, and the surface decomposition removed sufficiently to enable me to get a correct idea of the structure of the big vein. Similar work was undertaken at cut B, 165 feet west of the first cut. At a point 157 feet west or eight feet east of B cut, the hard quartz of the vein forms a natural upstanding reef, which is clearly marked, and reaches an altitude of four or five feet above the soil. The hanging-wall of cut B was found to be in a true line with the hanging-wall of cut A, and the width between the foot and hanging in


N (astronomical)
(mag.)
W
E
PLAN of Asbestos Island
P.t #2
P.t #1
P.t #6
P.t #5
P.t #4
P.t #3
1/2
1/4
1/8 mile
Scale, 9" = 1 mile



Plan of Workings on 400 ft Vein

cut B was about 43 feet. I, therefore, have assumed the average width of this large quartz deposit to be in the neighborhood of forty feet, and shall speak of it hereafter as forty feet in width. In cut C, where the depth of the surface was so great, quartz was found, but the time at our disposal did not permit us to reach either the foot—or the hanging-wall—with any certainty.

A large number of samples was taken, not only from the outcrop of the forty feet vein but also from the outcrops of the stringers lying to the south, and from the boulders which occur distributed downhill from the outcrop of the vein, over a length of over one thousand feet. All the samples taken were brought down to the assay tent at the main camp, and were there first put through a laboratory rockbreaker, and were then further reduced (either in the mortar or on the bucking board) to pass a screen with four meshes to the inch. The sample was then carefully quartered down until an amount of about eight or ten ounces was reached, which was put into a paper sample bag for fire assay; all the rest of the sample was then carefully panned by myself, to determine the amount of free gold.

The average of all these samples in free gold reached the sum of $2.50 per ton, including a number of samples (seven in number), which gave no trace of free gold. Separating the samples which were taken from the big, or forty feet vein, from those which came from other places, the average result in free gold is $3.14 per ton; an amount, I must say, which was very gratifying, and very surprising to me, also. As showing, however, the extreme variation in the amount of free gold in the samples, I may say that the smallest amount of free gold which I obtained was forty cents to the ton of rock, whereas the largest was $11.48 to the ton. In this connection

it is worthy of note that the samples taken from cut B were of very much higher tenor than those from cut A or cut C. The richest sample obtained, namely: that of $11.48 to the ton, was from cut B, as were also the next richest, namely: of $8.64 and $8.00 per ton, and I, therefore, am of the opinion that the distribution of the gold is not uniform throughout the big vein, but that, as in other places, there are enrichments of this vein in places, and cut B certainly appears to be one of these places.

It is a matter of regret to announce that the fire assay apparatus, which was taken up to Chibugamoo by Mr. McKenzie at considerable expense, was found to be defective after making a comparatively few fire assays. The extreme distance to Chibugamoo from the base of supplies, and the fact that the Chemists' and Surgeons' Supply Co. had only included one single burner in the apparatus which was sent up, eventually stopped our assaying on the ground, and the samples were packed and shipped down with the canoes which accompanied the laborers. I, therefore, am not positive of the undisturbed character of the samples which were assayed in Montreal, and I have not, and cannot include them in my report. I may say, however, that they ranged in value from $2.40 to $59.00 in gold, the latter of which, however, I have reason to doubt. My own opinion of the average fire assay value of the quartz is that it will be about $10.00 per ton. This is satisfactory, as fully thirty per cent. of the fire assay values is in a free milling state.

I should advise that the development of the gold property be proceeded with from time to time, as circumstances permit, but that no attempt be made to work the property *as a mine* until transportation is assured. The asset is one of undoubted value, but it must be clearly understood that this asset, like

Mr. Peter McKenzie. Mr. J. Obalski
Mr. Herbert McKenzie. Mr. Robert Simmons. Mr. G. McKenzie.

The McKenzie-Obalski Party, Aug.-Sept, 1904.

the one which I am about to describe (asbestos), is of comparatively no value to the corporation *until transportation is an assured fact.*

ASBESTOS.

The 17th and 18th of June were devoted to the cleaning up of the cuts on Asbestos Island, and to my personal examination of these cuts. Asbestos Island lies about 6½ to seven miles to the northeastward of your main camp, near the northern shore of McKenzie Bay. The island is nearly a mile in length, or slightly less, and the pits on the same are numbered very irregularly. The accompanying sketch of the island designates the pits with the number which has been given to them by the foreman. Pit No. 1 is near the western point of the island. It has been excavated to a depth of about six feet and a hole some eight to ten feet in diameter has been made to that depth. This pit shows a fibre running from one-half inch to an inch and a half in length, *very soft and silky* in appearance, and *very white* when shredded into wool. There are four or five seams in the pit which can safely be pronounced as A No. 1, best quality. The fibre is not of great length, but is long enough to make it readily marketable.

The next pit on the island, proceeding easterly, is No. 5. I may say here that, while a sufficient amount of excavation had been done in Pit No. 1 to get beyond atmospherie influence, the same cannot be said of any of the other five pits on the island. No. 5 pit shows two lengths of fibre, 3½ inches, and 5½ inches, both of very good quality. There are over eighteen seams visible, ranging in width from ½ inch to over 5½ inches, but the excavation has not yet gone beyond the reach of the atmosphere, and hence it is difficult to say just what the quality of this long fibre will be when undecomposed rock is reached. The present fibre is of extremely good qual-

ity, but is not so fine nor so silky as that obtained in No. 1. Owing to the length of fibre, however, there would be a very large demand for the asbestos obtainable from this pit, and I am personally of the opinion that the quality of the fibre will be found to be as good as that in No. 1 so soon as excavation reaches the point where the chrysotile has not been affected by the atmosphere.

No. 6 pit is high up the hill, and almost due east from No. 5. The country rock is a hard green pyroxenous substance, seamed in one or two places by bands of what appear at first sight to be silicious limestone, or dolomite, but which on examination proved to be aluminates of lime and magnesia, and to be, possibly, a variety of the mineral nephrite. No one of these seams was discovered of a greater width than 1½ inches, but the fibre in the vicinity of these seams (both in this pit No. 6 and in No. 4) is coarser and harsher than in No. 5, and much more so than in No. 1. The foregoing remarks apply also to pit No. 4, as well as to No. 6. Both pits show fibre ranging from ½ inch to 1½ inches in length, but the fibre is frequently traversed by transverse seams, parallel to the containing walls, which shorten it. Whether these separating, or transverse, seams will die out as depth in the rock is obtained is by no means sure, but if they should, the quality of the fibre will be excellent.

No. 3 is the pit farthest to the south, and distant fully half a mile from pit No. 1. It contains fibre ranging from ½ inch to over one inch in length, of exceeding good quality, of a bright silky lustre and of a pure white color, very much like that found in pit No. 1. There are very many seams of this in No. 3 pit, and the formation of the ground would easily permit of pits 3, 4 and 5 being worked in one large, open cut or quarry, and the depth of water on the south side of the island

is great enough to allow of dumping the waste material there in tremendous quantities.

Pit No. 2 is on the north side of the island, and nothing much has been done there, therefore, no account is taken of it in this report.

The quality of the asbestos which you have here is unquestionably good, and it can be mined with ease when proper machinery is introduced. The variety is of the same kind as is found in Thetford and Black Lake, namely: chrysotile. At first, and before a chemical examination was possible, I inclined to the opinion that the fibre in pits 5, 6 and 4 was the Italian "Amianthus," a variety of amphibole, but, on examination, fibre from pits 4 and 5 yielded about sixteen per cent. of water and the fibre from pit No. 1 yielded exactly fourteen per cent., which is about the normal amount of water that is found in the chrysotile of Thetford.

In this deposit you have an asset of tremendous value and one which cannot be fully appreciated from any written description. As a help to a proper conception of it permit me to state that the King mine at Thetford was recently sold to Boston people for the sum of $1,250,000 paid in cash, and that it does not contain as many seams of chrysotile as have been counted on your property; it has, however, a very great advantage in being located practically on the line of the Quebec Central Railroad. Were transportation by railway possible from Asbestos Island I should not hesitate to place an equal, or a greater, valuation upon your Asbestos Island.

SUMMARY.

I may, therefore, briefly summarize my conclusions as expressed in detail above:—

(1) Your asbestos property contains a very large amount of commercial fibre of good quality; at the present time it is useless because it is 205 miles from the beginning of rail transportation; when rail transportation has been secured this property alone will be able to earn very satisfactory dividends on a capital in excess of $1.000,000.

(2) Your property also contains a deposit of quartz carrying both free and combined gold to an amount approximating $10 per ton over a length of 400 feet and a width of 40 feet—this fact is proved. There is every ground for believing that this length will be found to be two thousand feet or more, but as yet it has not been proved. Of this $10 per ton at least $2.50 to $3.00 per ton is easily obtainable by stamp-milling; the remaining $7.00 or $8.00 is combined with the pyrites which occurs frequently in the vein. These pyrites are disseminated somewhat irregularly, occurring at times in pretty large bunches of a foot or two in diameter, and, at other times, being scattered in small particles irregularly along certain lines of cleavage.

To work this asset (the value of which is as yet not approximated) will require the use of heavy and bulky machinery for the transportation of which there is no provision: furthermore, the obtaining of the maximum amount of the gold present in the ore will require the use of the chlorination or cyanide process, which, in its turn, will consume very considerable weights of reagents or chemicals the transportation of which is equally impossible with that of the machinery. It is my belief, based on evidence which is not susceptible of proof to you, that this asset is of equal value with that of the asbestos: further work, I trust, will afford proof which will be satisfactory to all of your shareholders.

(3) I do not advise the expenditure of any time or money

in the endeavor to find either copper or iron at the present time. Both of these minerals are base and of comparatively lesser values, and, therefore, transportation must be even cheaper for their successful exploitation than for asbestos and gold.

It was my intention to illustrate this report with some copies of photographs taken by Mr. Croze and Mr. McKenzie, which I am unable to do in time for your meeting, which is called for the 17th inst. I shall have pleasure, if allowed, in sending you a duplicate of this report with the illustrations mentioned. I also beg to enclose copies of documents between us accompanied by my account for services.

I have the honor to be,

Your obedient servant,

JOHN E. HARDMAN.